

Recycled Tires in Playground and Track Surfaces

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Purpose of Recycled Tire Playground and Track Surface Study

- CIWMB demonstrates public health vision and ethical stewardship to ensure:
 - Toxicologic Safety from ingestion or dermal contact.
 - Physical Safety by preventing serious head injury from falls in the playground.
 - Ecologic Safety from runoff.

Survey of CIWMB Grantees

Profile of Playgrounds Surveyed

- CIWMB Grantees in Bay Area and Central Valley
- Pour-in-Place: 44
- Tiles: 4
- Shreds: 3

Components of Playground Surfaces

- Pour-in-place surfaces and tiles use styrene-butadiene rubber (SBR).
- For pour-in-place surfaces, SBR is mixed with binder and poured at the playground site.
- Synthetic rubber - propylene diene monomer (EPDM) mixed with a binder and poured into the playground to serve as a top layer.
- Shredded SBR used much like wood chips.

Study Approach

- Conduct Literature Search
- Measure chemicals released by:
 - 1) shreds from loose-fill surfaces
incubated in aqueous solution overnight
{simulates ingestion}
 - 2) wipe sampling of tile and pour-in-place
surfaces {simulates hand-to-surface-to-mouth
contact}
- Measure impact attenuation by all surfaces as a
predictor of head injury

Chemicals released by tire shreds in gastric digestion simulation

Pepsi, citric acid (buffer), sodium citrate (buffer), potassium chloride, sodium chloride, distilled water with pH = 2.3

- 13 metals detected (zinc, copper, lead, barium, cobalt...)
- 11 organics detected (benzothiazole, aniline...)
- For a one-time ingestion of ten grams of shreds adverse health effects considered unlikely

Chemicals detected by wipe sampling P-I-P and tile surfaces

- 10 metals detected
- 6 organics detected
- For playground use 185 days/year for 11 years (age 1 to 12) adverse health effects considered unlikely due to chronic hand-to-surface-to-mouth activity

Skin Sensitization Test

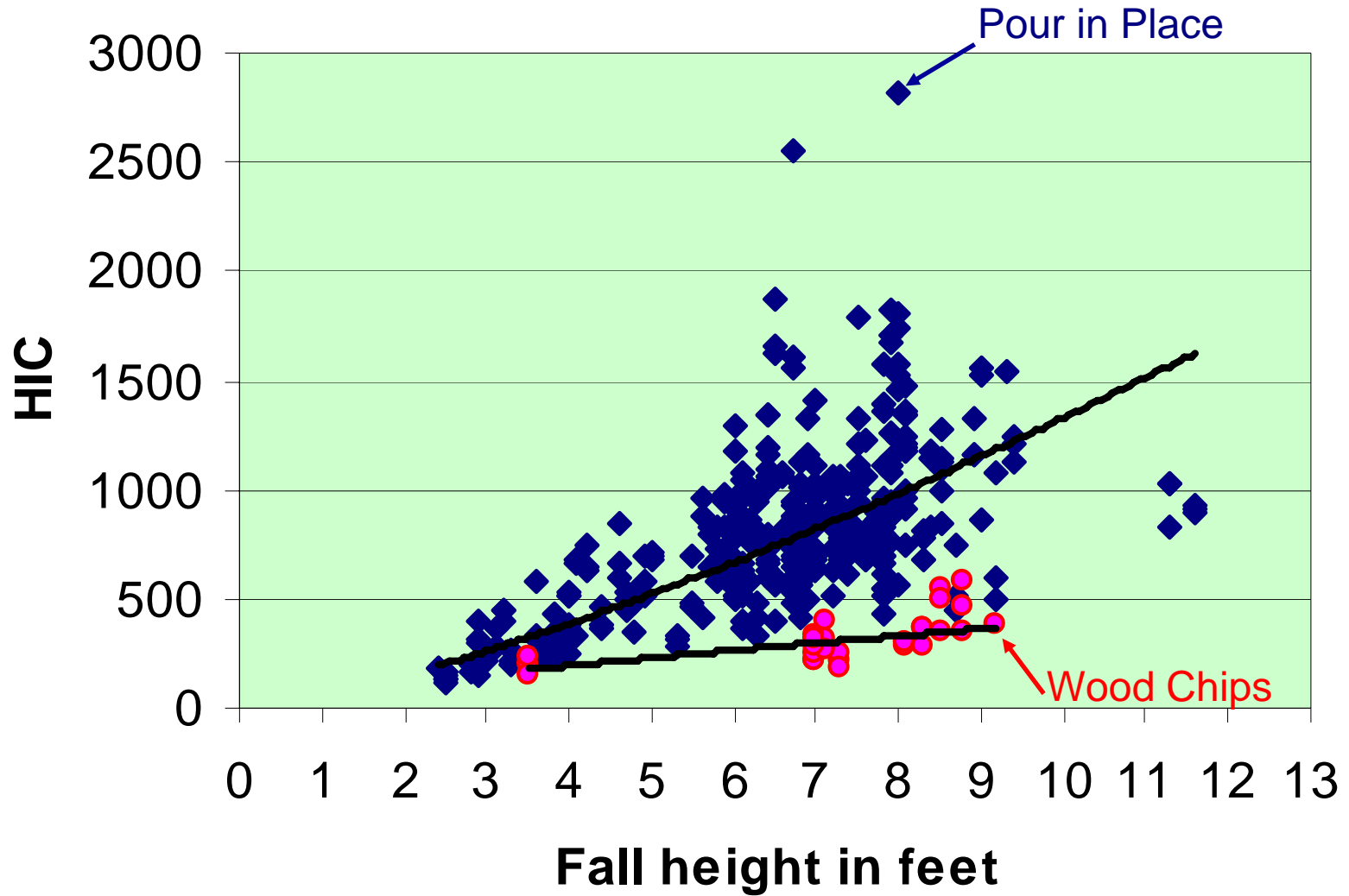
- Concerns about latex, EPDM, and SBR
- Performed by a testing laboratory
- Guinea pig skin sensitization test
- No skin reactions observed suggesting such reactions unlikely in children using these surfaces

Evaluating the Risk of Serious Head Injury

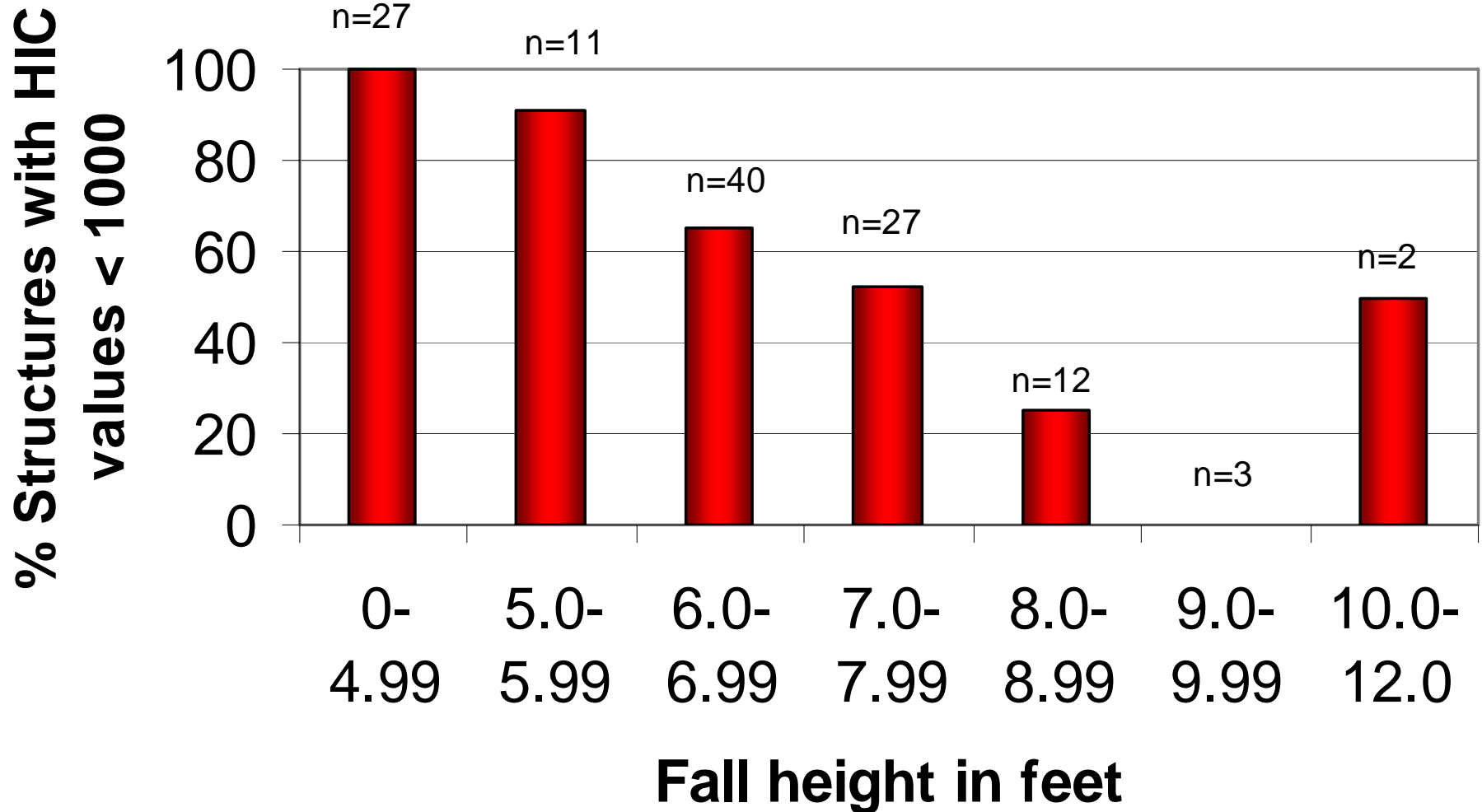
- Up to 80% of serious playground injuries are from falls to the surface.
- CDC—Playground injuries cost \$1.2 billion.
- 1,299 California hospitalizations from fall injuries (2003).
- For each hospitalization, 22 ER visits.
- We estimated about 28,500 fall-related injuries/yr.
- Tested 121 structures at 32 playgrounds.
- Compared Head Impact Criterion (HIC) to ASTM standard--basis for regulatory standard of 1000 HIC.



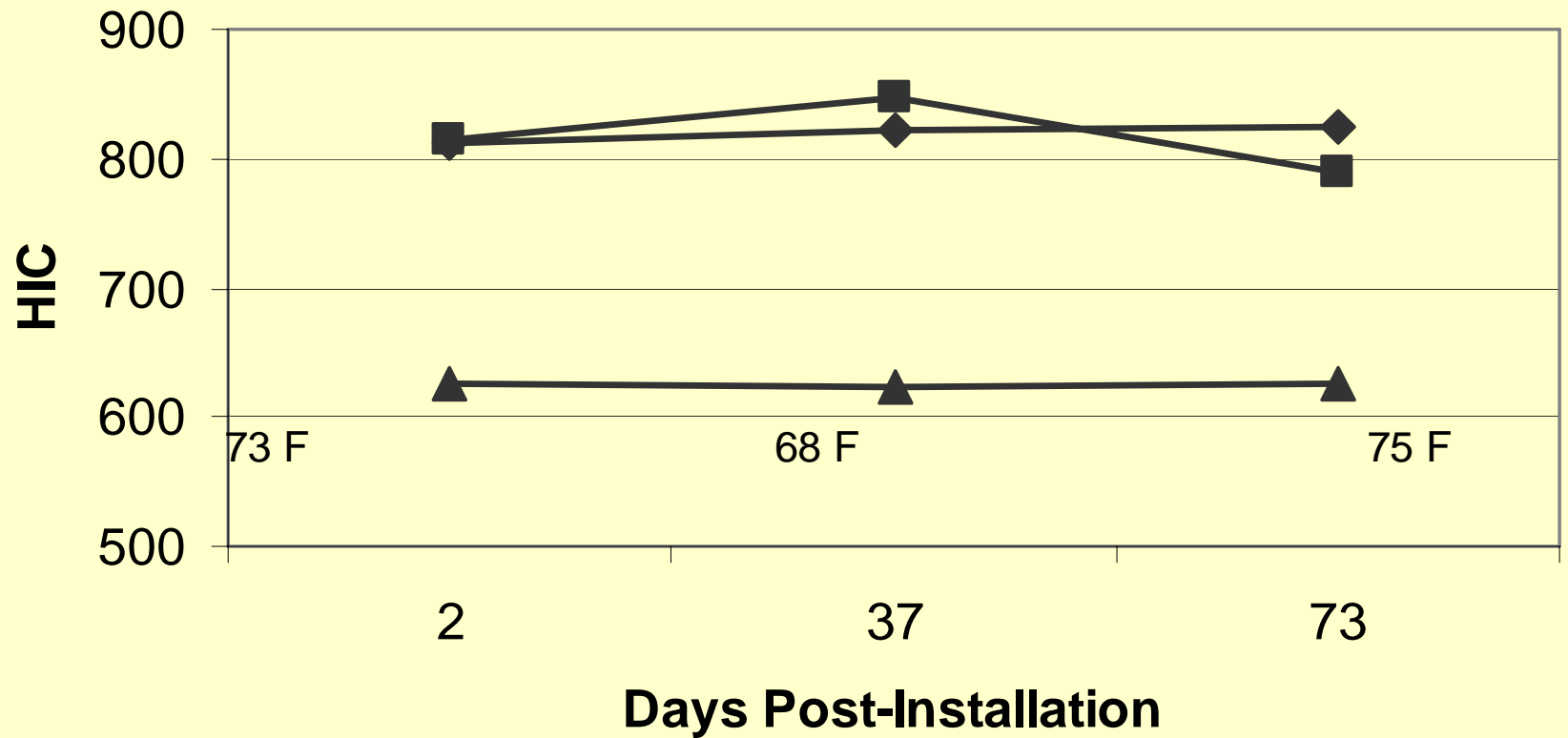
Fall Height vs HIC



Structures (percent) passing standard at indicated fall heights



HIC versus Surface Age: Playground #1



HIC standard compliance rates for playground surfaces: rubber vs wood

% passing HIC

Rubber surface (121/32)

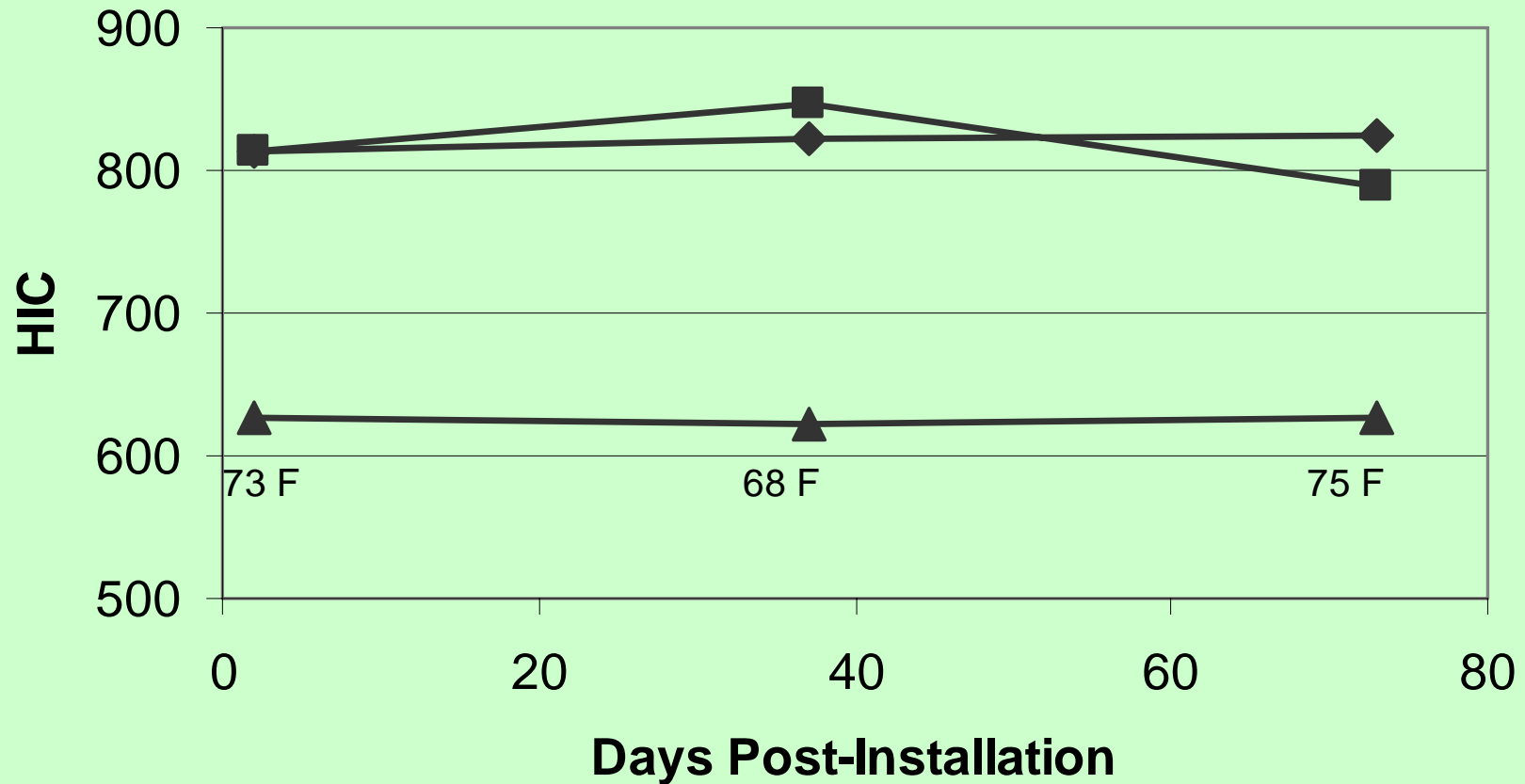
31%

Wood chip surface (32/5)

100%

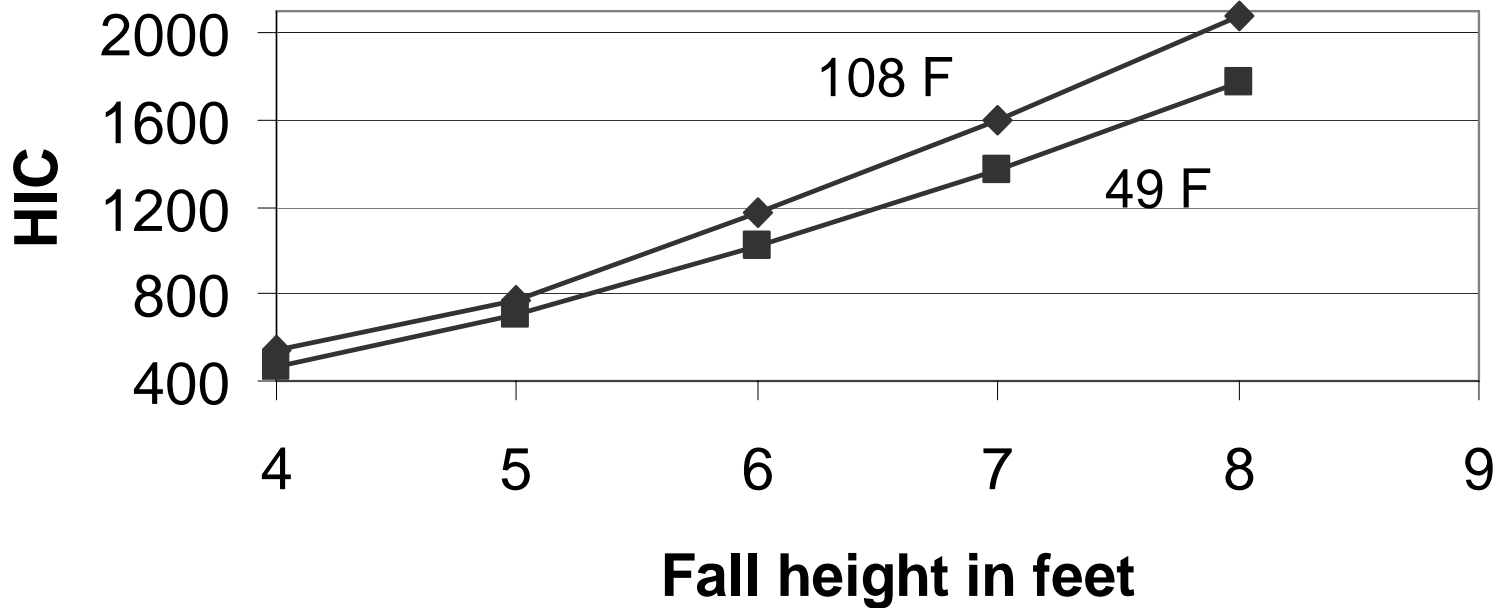
HIC Measurements Taken at 3 Locations After Installation

HIC versus Surface Age



Measurements Taken One Location at Different Times and Temperature

HIC vs fall height at two surface temperatures



Playground test results: L.A. USD experience

- Did not use current ASTM standard at time of testing (only made 3 measurements/playground).
- 300 rubberized surfaces installed in last 2-3 years with only 2 failures
- 8 foot max on fall height
- No swings
- Testing always performed immediately following installation
- Conclusion: testing works!

Recommendations

1. Obtain warranty that surface will meet the standards-
test the surface after installation.
2. Test surface during the warmest time of day
3. Consider bright, reflective colors to reduce the high
surface temperatures that can develop during hot days
4. Consider installing a thicker surface that significantly
exceeds the standard

Unresolved Issues

1. Does rubberized playground surface softness change over time (years)?
2. Do rubberized playground surfaces prevent or increase long-bone injuries?
3. How do findings in CIWMB contract-funded playgrounds compare to a broad sampling of other playgrounds, e.g. southern/northern Cal, sand, and wood chips?
4. Fine rubber crumb in indoor and outdoor artificial turf fields:
 - What is its composition and particle size differentiation?
 - Can individual exposure be measured and is it inhaled during play?
 - Does it pose a toxic risk?

Full Report

<http://www.ciwmb.ca.gov/publications/Tires/62206013.pdf>

A committee is a dark alley, down which good ideas are lured and then strangled.